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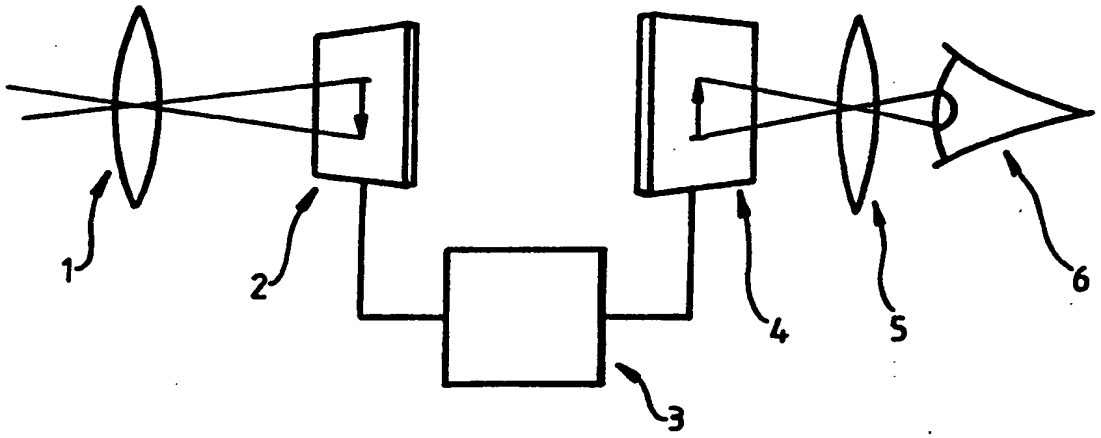
Published
With international search report.
In English translation (filed in Swedish).

(54) Title: VIEWING INSTRUMENT



(57) Abstract

The invention relates to a viewing instrument wherein the image being viewed by the user may be frozen owing to the provision of a memory function. In connection with the freezing of the image, the latter may be magnified in such a manner that a highly magnified image may be viewed without such discomfort as is due to shaking movements of the image while the user may perform a wide-angle-of-vision search for an image to be magnified.

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VIEWING INSTRUMENT

In using conventional hand-held viewing instruments the largest useful magnification is restricted by the difficulty experienced by the user of holding such hand-held instruments sufficiently stable. The slightest shaking movement of the instrument causes the image viewed by the user to shake also. In the case of high degrees of magnification, the shaking movements affect the image to such an extent that as to make perception thereof difficult. Hand-held viewing instruments therefore are rarely used for magnification above ten. Magnification to seven or eight is common for practical purposes.

When viewing instruments are used to view objects that appear small against a large background, such as birds or aeroplanes against the sky, high-magnification instruments may make it difficult to find the objects one wishes to study. High magnification reduces the field of vision.

In a viewing instrument in accordance with the present invention these disadvantages related to the shaking motions and to the difficulties in finding the target objects may be overcome. This is achieved by the possibility of freezing the instrument-produced image. The frozen image may then be studied without inconvenience, also if the instrument itself is subjected to shaking movements. This technique provides the viewer with the possibility of studying the frozen image in detail under larger magnification. To find the object to be viewed, the viewer uses a low degree of magnification, which provides him with a large field of vision. Once he has found the object he seeks and preferably has centred it to the centre field of the image, he freezes the image and may study the image without the latter being subjected to shaking movements. At this stage it is also

possible to magnify the frozen image. If in this case the image is centred on the object the viewer wishes to view in closer detail, enlargement of the central part of the image suffices for that purpose.

One embodiment of the invention is illustrated in Fig. 1, wherein numeral reference 1 designates a focus lens or objective producing an image on the electronic retina 2. From the retina data signals representative of the image are forwarded to the processing and memorising unit 3, the latter being connected to a screen 4 displaying an image that may be received by the viewer's eye 6 via the ocular 5. While the viewer is looking for some object to be studied in closer detail, the screen constantly and in real time displays the image registered by the electronic retina at any moment. When a button (not shown in the drawing figure) is depressed, the image displayed on the screen 4 freezes into a standstill, and thus the displayed image no longer coincides with that registered by the electronic retina. This allows the viewer to study the non-shaking image in peace and quiet until such time as he releases the button and in response thereto the image displayed on the screen 4 again in real time shows the image being registered by the electronic retina 2. The freezing feature may be achieved e.g. with the aid of a memory function incorporated in the processing unit 3. However, an equivalent memory function installed in the screen 4 or the electronic retina 5 could be used to provide this function. As an alternative to image freezing by means of a depression-activated button, freezing may be effected with the aid of a timer set to automatically provide alternating moving and frozen images at suitable intervals.

The magnification that the viewer experiences when using this kind of viewing instrument is a result among other things of the focal lengths of the optical systems 1 and 5 and of the dimensions of the electronic retina 2 and the display screen 4. In a simple variety of the

invention, the magnification degree rests constant. In accordance with a more sophisticated form the invention, the magnification changes as the image freezes, and this is due to such a change of the transfer of the image from the electronic retina 2 to the display screen 4 effected by the processing unit 3 that only a smaller section of the area of the electronic retina 2 is pictured, spread across the entire surface of the display screen 4. This additional magnification when viewing a frozen image could either be set at a fixed value or be selected by setting the process unit 3.

Electronic retinas and display screens typically operate by division of the areas into a large number of smaller elements or pixels. In order for the magnified image as described above to be completely useful and show a larger number of details than the non-magnified image, the number of such pixels in the magnified area of the electronic retina must be equal to the number of pixels of the entire display screen. To use different pixel densities in different parts of the electronic retina may be complicated and expensive. Also, to use an electronic retina exhibiting high pixel density over its entire area may also be an expensive solution.

Fig. 2 illustrates an embodiment of the invention wherein these problems have been solved by the use of two different focus lenses 7 and 8, each having its respective electronic retina 9 and 10. In this case, the focus lens 7 is adapted to the electronic retina 9 in such a manner as to give the system a moderate degree of magnification but a considerable angle of vision. The focus lens 8, on the other hand, is so adapted to the electronic retina 10 that the degree of magnification of the system becomes high but at the expense of a reduced field of vision. When electronic retinas of equal dimensions are used, a focus lens having a longer focal length results in a higher degree of magnification.

In this case the processing unit 3, when searching for an object, supplies a constantly up-dated real-time image on the display screen 4, which image is received from the optical system formed by the focus lens 7 and the electronic retina 9. In response to depression of a button, the processing unit 3 shifts to displaying a frozen image received from the optical system formed by the focus lens 8 and the electronic retina 10. This latter image thus is an enlarged and still section of what has been shown previously.

The two electronic retinas 9 and 10 need not be physically separated. They may be individual parts of a larger electronic retina. It is likewise possible to use one electronic retina only, which is adapted to move by mechanical means between two positions and be exposed to receive images from one of the two lenses having different focal lengths. An identical effect may be achieved by means of a stationarily positioned electronic retina exposed to receiving images optically linked to said retina via moving mirrors or prisms. Alternatively, the focus lenses may exchange positions, and so on. The single electronic retina could also be exposed to receive two different images one of which is alternatingly screened off by a movable screen. The object in question could also be viewed optically in the form of a wide-angle image one portion of which, preferably a central portion, is treated as outlined above.

The same effect may be achieved by using one single electronic retina, which registers the image received from a focus lens having a variable focal length.

The instrument described above is in principle a mono-ocular viewing instrument used for one eye only. Two such instruments, when interconnected, results in a binocular type of viewing instrument used for both eyes. An instrument of this type is more comfortable and less eye-fatiguing. In order to obtain a less expensive instrument structure while retaining the above advantage,

the instrument may be designed in such a manner that only a front part is used, having one or two focus lenses and one or two electronic retinas as defined above, which are connected to a processing unit supplying identical images to two different display screens, one for each eye. Alternatively, a larger display screen, which may be viewed by both eyes, could be used.

CLAIMS

1. A viewing instrument, c h a r a c t e r i s e d in that it is provided with a memory function to freeze the image being viewed by the user.

2. A viewing instrument as claimed in claim 1, c h a r a c t e r i s e d in that it is arranged to magnify the frozen image being viewed by the user relative to the non-frozen image.

3. A viewing instrument as claimed in claims 1 and 2, c h a r a c t e r i s e d in that it is provided with a control means, preferably a depressible button, for image freezing.

4. A viewing instrument as claimed in claims 1 and 2, c h a r a c t e r i s e d in that it comprises a timer for time-interval freezing of the image.

5. A viewing instrument as claimed in claims 1-4, c h a r a c t e r i s e d in that to provide the memory function, the instrument comprises an electronic processing unit (3) which connects one or several electronic retinas (2) with an electronic display screen (4).

6. A viewing instrument as claimed in claims 1-5, c h a r a c t e r i s e d in that it comprises only one electronic retina (2), and in that said electronic retina (2) is arranged to be optically or mechanically exposed to receive different-size images in such a manner that the frozen image being viewed has a larger size on the display screen (4) than the non-frozen image, the latter image in contrast comprising a larger angle of vision.

7. A binocular-type of viewing instrument as claimed in claim 1-6, c h a r a c t e r i s e d in that it consists of two interconnected viewing instruments.

8. A viewing instrument for both eyes as claimed in claims 1-6, c h a r a c t e r i s e d in that it consists of a viewing instrument modified so as to comprise two display screens, one for each eye and showing the same image.

1/1

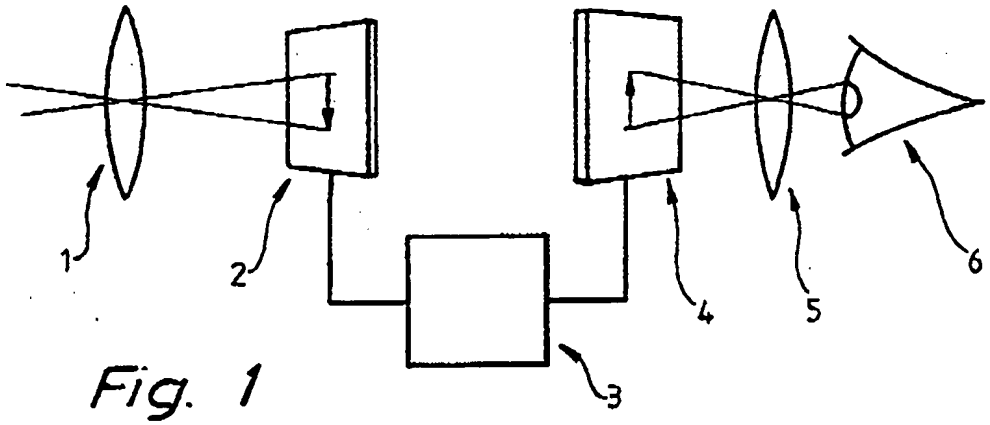

Fig. 1

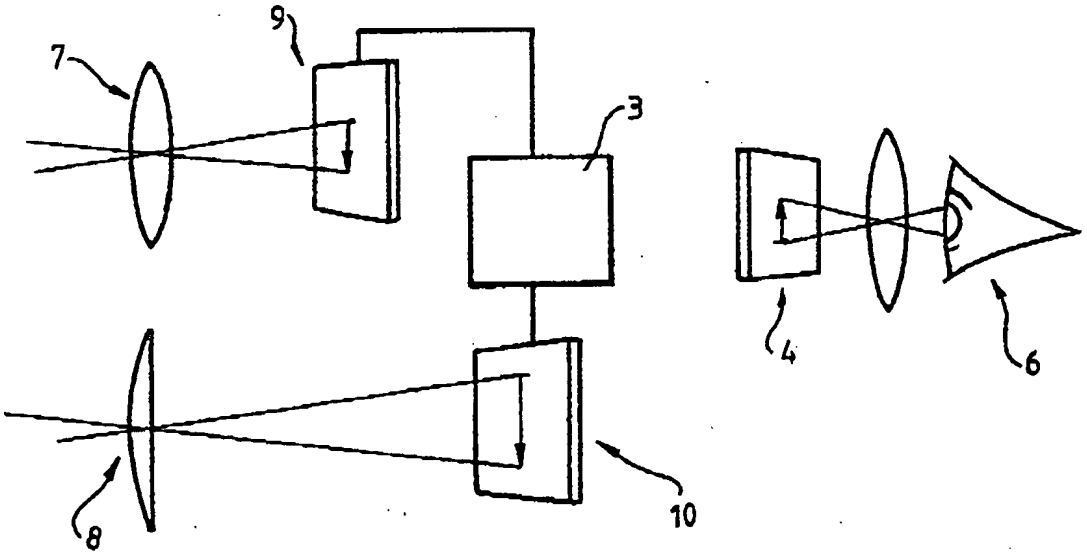

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 97/01846

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: G02B 23/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4310849 A (S.M. GLASS), 12 January 1982 (12.01.82) --	1-8
A	US 4395731 A (A. SCHOOLMAN), 26 July 1983 (26.07.83) --	1-8
A	US 4504129 A (R. VAN IDERSTINE), 12 March 1985 (12.03.85) --	1-8
A	US 4523821 A (W. LANG ET AL), 18 June 1985 (18.06.85) --	1-8

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 February 1998	10 -02- 1998
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Filip von Friesendorff Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 97/01846

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4631580 A (J. TAUBE ET AL), 23 December 1986 (23.12.86) --	1-8
A	WO 9525979 A1 (PHILIPS ELECTRONICS N.V.), 28 Sept 1995 (28.09.95), abstract --	1-8
A	US 4516157 A (M.G. CAMPBELL), 7 May 1985 (07.05.85), abstract --	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

07/01/98

International application No.
PCT/SE 97/01846

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4310849 A	12/01/82	NONE	
US 4395731 A	26/07/83	NONE	
US 4504129 A	12/03/85	EP 0052644 A	02/06/82
		WO 8103417 A	10/12/81
US 4523821 A	18/06/85	DE 3150124 A,C	14/07/83
		FR 2518392 A	24/06/83
		GB 2112171 A,B	13/07/83
		JP 58109028 A	29/06/83
US 4631580 A	23/12/86	GB 2167919 A	04/06/86
WO 9525979 A1	28/09/95	EP 0711421 A	15/05/96
		JP 8511715 T	10/12/96
US 4516157 A	07/05/85	DE 3342126 A,C	07/06/84
		JP 1695436 C	17/09/92
		JP 3062356 B	25/09/91
		JP 59107686 A	21/06/84

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
2976420		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/SE97/01846	05.11.1997	09.12.1996
International Patent Classification (IPC) or national classification and IPC_6		
G02B 23/00		
Applicant		
Heed, Björn et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
12.06.1998	12.11.1998
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Telex 17978 PATOREG-S Facsimile No. 08-667 72 88	Authorized officer Filip von Friesendorff Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE97/01846

I. Basis of the report

1. This report has been drawn on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☒ the international application as originally filed.

☐ the description, pages _____ , as originally filed,
pages _____ , filed with the demand,
pages _____ , filed with the letter of _____ .
pages _____ , filed with the letter of _____ .

☐ the claims, Nos. _____ , as originally filed,
Nos. _____ , as amended under Article 19,
Nos. _____ , filed with the demand,
Nos. _____ , filed with the letter of _____ .
Nos. _____ , filed with the letter of _____ .

☐ the drawings, ~~sheets~~/fig _____ , as originally filed,
~~sheets~~/fig _____ , filed with the demand
~~sheets~~/fig _____ , filed with the letter of _____ .
~~sheets~~/fig _____ , filed with the letter of _____ .

2. The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, ~~sheets~~/fig _____

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the supplemental Box (Rule 70.2(c)).

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SE97/01846

V. Resoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-8	YES
	Claims		NO
Inventive step (IS)	Claims	1-8	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-8	YES
	Claims		NO

2. Citations and explanations

The claimed invention relates to a hand-held viewing instrument for magnification of observed objects. When observing a object at high magnification with such an apparatus the movements of the user makes it difficult to make a good perception. It is therefore difficult to use a viewing instrument with a magnification higher than ten. When viewing small objects against a large background, such as aeroplanes against the sky, a high-magnification instrument may make it difficult to find the objects one wishes to study. The objective of the claimed invention is to construct a viewing instrument that do not have the weakness' mentioned above.

The solution according to the invention comprise a binocular provided with a memory function to freeze the image being observed by the user.

Documents have been cited in the International Search Report:

US, 4 310 849, A
US, 4 395 731, A
US, 4 504 129, A
US, 4 523 821, A
US, 4 631 580, A
WO, 9525979, A1
US, 4 516 157, A

From the American document US, 4 95 731, A is a television microscope for surgical use earlier known that incorporates a video camera with a possibility to record the view and to magnify the image observed by the user. It does not include a memory function to freeze the image being viewed by the user other than it can record the images and that they can be showed individually later on at a television apparatus. The invention claimed in claims 1-8 differ from this as mentioned above.

.../...

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V.

The other documents cited in the International Search Report show different types of magnification instrument but none of them includes a binocular with a memory function to freeze the image being observed in that moment.

According to the arguments stated above does the referred documents differ from the claimed invention. Therefore is the invention, claimed in claims 1-8, novel and is considered to involve an inventive step and to comprise industrial applicability.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

United States Patent and Trademark Office
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in its capacity as elected Office

Date of mailing (day/month/year) 07 July 1998 (07.07.98)	
International application No. PCT/SE97/01846	**Applicant's or agent's file reference** 2976420
International filing date (day/month/year) 05 November 1997 (05.11.97)	**Priority date** (day/month/year) 09 December 1996 (09.12.96)
Applicant HEED, Björn et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

12 June 1998 (12.06.98)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38